who attacks experimentally the problems of his manufactures; for he knows if they are once discovered his use is past. On the other hand, if foreman work is done by a chemist, trained in experimental methods and anxious to improve his product (and his position), reforms can be made, and are willingly undertaken. We in England are in a similar plight; one of the greatest preventives to progress is the foreman. Why, many chemists would be glad of his 3*l.* a week, and would be infinitely more useful.

A closer intimacy between professor and manufacturer is strongly urged. But in France there is apparently mutual distrust. The standing of the professors is low, for one thing, the best paid post (at Paris) bringing in only 800*l.* a year; in the provinces the salaries run from 240*l.* to 400*l.* This contrasts unpleasantly with German salaries, which seldom fall below 600*l.*, and may amount to 3600*l.* In France, many men have a taste for the career of professor, and will work cheap for glory; "that is the French character." Most French professors, according to one of them (rashly named in this article), do nothing and care nothing for industry. In short, collaboration between manufacturer and chemist is wanting owing to jealousy of the latter towards colleagues who meddle with industrial problems, to ignorance and shyness of both parties, and to the want of any intermediary who can bring them into contact.

Besides the recommendations stated in the outset, it is advised that special schools be created, *e.g.* for perfumes, for colours, for soaps, where young chemists shall receive special training.

Now what can we in England learn from this exhaustive discussion? We have many of the same defects; we suffer from the supremacy of the foreman; from the want of interest in industry of the professors (although this is lessening); from the want of intelligence and scientific training of many manufacturers; and from the lack of special schools. In the old days of the Le Blanc soda process the works served as schools for young chemists; now things are too specialised. In prosperous times, the manufacturer does not see the need of a chemist; when bad times come, the luxury of a chemist cannot be afforded. What we want, what the Germans have got, and what the Americans are rapidly getting, is a race of scientifically trained manufacturers; combinations of those engaged in the same industry, so that common laboratories of research may be kept running; the replacement of rule-of-thumb foremen by chemically trained submanagers of a better class, who have had something in the nature of a scientific education, and who are imbued with the spirit of research, leading them to keep their eyes open to every possible improvement; this they would gain first in actual educational establishments, under the guidance of capable professors, and later in the special laboratories mentioned above; and lastly, thorough cooperation between teachers and manufacturers, so that problems capable of being solved in a university laboratory, and of scientific interest, should be transferred there, with the prospect of an ultimate reward should they prove commercially useful; and a liberal attitude of mind on the part of manufacturers, so that they would take a little trouble to become acquainted with the progress of scientific chemistry, with the view of its utilisation for money-making purposes, and a readiness to consider any problems suggested in the university laboratory, with the view of their being worked out industrially. We are moving slowly towards attaining this ideal. Is it any comfort that France appears on her own showing to be more backward? Until the people concerned learn to view such problems from a scientific standpoint, little more can be done. The only thing is for those who can to preach, and above all to practise.

W. R.

NOTES.

The new session of Parliament was opened on Tuesday by the King, who was accompanied by the Queen, with the customary ceremonial. The King's speech to the House of Commons announced that provisions for amending the laws relating to education in Scotland will again be brought forward, and that a proposal for establishing a Minister of Commerce and Industry will be introduced.

At the annual meeting of the Royal Astronomical Society on Friday last, the gold medal of the society, awarded by the council to Prof. Boss, director of the Dudley Observatory, Albany, New York State, was received by Mr. Choate, the United States Ambassador, for transmission to Prof. Boss. The president afterwards handed to the secretary the Jackson-Gwilt bronze medal for transmission to Mr. Tebbutt, who for many years has carried on astronomical research in his observatory in New South Wales.

At a meeting of the trustees of the Percy Sladen fund, held at the Linnean Society, Burlington House, on February 3, grants varying in amount were made to Mr. W. R. Ogilvie Grant, toward the expenses of a collector for the British Museum in Central Africa; to Miss Alice L. Embleton, to enable her to continue her investigations in insect cytology; and to Mr. J. Stanley Gardiner, toward the expenses of an expedition to the Indian Ocean.

M. Radau has been appointed president, Vice-Admiral Fournier vice-president, and M. Bigourdan secretary of the Bureau des Longitudes, Paris.

M. F. J. P. Folie, honorary director of the Royal Observatory at Brussels, died at Liège on January 29 in his seventy-second year.

We regret to see the announcement of the death of Mr. Robert Tucker, who was for thirty-five years (November, 1867–November, 1902) honorary secretary of the London Mathematical Society.

Reuter states that the Argentine sloop of war *Uruguay*, last reported at Punta Arenas, has returned to Buenos Ayres after her voyage in the Antarctic seas, having failed to obtain any news of the French Antarctic Expedition under Dr. Charcot.

It is proposed to establish an International Association of Anatomists at a meeting to be held at Geneva on August 7–10. The initiative has been taken by the anatomists of the Swiss universities and has the support of the anatomical societies of Germany, Great Britain, France, Italy, and America.

The *Athenaeum* announces the death, on January 29, of Prof. H. Landois, professor of zoology and director of the Zoological Garden at Munster, in his seventieth year. Prof. Landois was the author of "Der Mensch und das Tierreich," "Das Pflanzenreich," "Das Mineralreich," and other works.

Captain John Donnell Smith, of Baltimore, has given, says *Science*, to the Smithsonian Institution his private herbarium consisting of more than 100,000 mounted sheets and his botanical library of nearly 1600 bound volumes. Captain Smith's collection is probably the largest private herbarium in America, being very rich in tropical plants.

A TELEGRAM has been received at the office of the Scottish National Antarctic Expedition in Edinburgh announcing the safe arrival at Buenos Ayres of Mr. R. C. Mossman, who was left in charge of the meteorological station at Scotia Bay, South Orkneys, last February. Mr. Mossman has spent two continuous years in the Antarctic regions.

THE Treasury has agreed to make a contribution from public funds toward the cost of establishing and maintaining a national museum and a national library in Wales, on the condition that sufficient local support is forthcoming. The Lord President of the Council has appointed a committee of the Privy Council to consider and determine the place at which each of the two institutions should be established and other matters relating to their foundation and future maintenance.

M. JACQUES FAURE accomplished a successful voyage in a balloon from London to Paris on February 12. He left the Crystal Palace at 6.45 p.m. on February 11 with M. Hubert Latham, and they at once rose to a height of 500 metres, which they kept until within sight of the sea, near Hastings. They then descended until the guide-rope touched the water, when they travelled at the rate of 110 kilometres an hour. At 10 p.m., seeing a lighthouse, they rose to 2000 metres, and soon passed over Dieppe. The balloon descended at St. Denis, outside Paris, six hours after starting.

WE regret to see the announcement of the death of Mr. William Sellers, the eminent mechanical engineer of Philadelphia. When president of the Franklin Institute in 1864, he read a paper on screw-threads and nuts, and his form of thread subsequently became the standard for the United States. He had many friends in this country. He was a member of the Institution of Civil Engineers, and as chairman of the Philadelphia committee took an active part in the reception of the Iron and Steel Institute in its recent visit to America.

THE new Premier diamond-mine, situated about twenty miles W.N.W. of Pretoria, in the Transvaal, produced in January of this year an enormous diamond far surpassing in size the largest previously known. It measures 4½ × 2¼ inches, is said to be of excellent quality, and weighs 3032 carats (=676½ grams, or nearly 1½ lb. avoirdupois). The largest diamond previously discovered is the "Excelsior," which was found in 1893 in the Jagersfontein mine, Orange River Colony, and was valued at 1,000,000*l*. It was as large as a hen's egg, weighed 971¾ carats, and has been cut into nine brilliants. The world-famous Indian diamonds, the "Koh-i-noor" and "Great Mogul," are considerably smaller than the "Excelsior," and compared with this huge latest-found diamond their size sinks into insignificance. An account of the Premier mine was recently published in the report for 1903 of the Geological Survey of the Transvaal (NATURE, 1904, lxxi., p. 55). The mine was opened up in 1902, since when it has produced a rich yield. It is of the same type as the Kimberley mines, but considerably larger in size. The pipe containing the "blue-ground" has an oval-shaped cross-section; its longer diameter measures just over half a mile, and its area is estimated at 350,000 square yards. The pipe breaks through felsitic rocks, which were earlier intruded in the quartzites of the Pretoria series.

"NOTES on Phosphorescence in Plants and Animals" is the title of a paper by Miss Bage in the *Victorian Naturalist* for November last, of which the author has been good enough to send us a copy. Special attention is directed to the occurrence of phosphorescence in butchers' meat, since a remarkable prevalence of this has been recently noticed in Melbourne. So far as the author could ascertain, no cultures have been taken from phosphorescent meat, so that the bacteria by which the phenomenon is produced are still unknown.

The Times of February 9 devotes nearly a whole column to the collection of giraffes in the Natural History Museum, which has recently been enriched by examples of the Kilimanjaro and Nigerian races. The article mentions the names of the various donors of the series in the national collection, which is altogether unrivalled. Brief reference is made to the earlier specimens of giraffes brought to this country, and to the history of the evolution of our knowledge of the local variations of the species. In conclusion, special attention is directed to the importance of ascertaining the reason for these and analogous colour-variations in animals.

WE have received copies of Nos. 1 to 3 of the fourth volume of the Goeldi Museum at Para, the first of which is dated February, while the other two were published in December, 1904. The catalogue of Para mammals in No. 1, by Messrs. Goeldi and Hagmann, has been already noticed in our columns. Among the contents of Nos. 2 and 3, mention may be made of a list of the mosquitoes of Para by Dr. Goeldi, with an account of the measures taken to exterminate *Stegomyia fasciata* and *Culex fatigans*, and also of Dr. Hagmann's synopsis of the birds described by Spix, Wied, Burmeister, and Pelzeln. Considerable interest attaches to a paper on a disease which has recently affected domesticated animals in the Island of Marajo.

THE *Scientific American* of January 21 contains an illustrated account of the setting-up in the American Museum of Natural History, New York, of a skeleton of the dinosaur Brontosaurus, obtained from the deposits near the famous Bone Cabin Quarry in 1898. The skeleton, which is the largest and at the same time the least incomplete specimen of its kind, is being set up under the immediate direction of Prof. Osborn, and will be the only mounted example of the bony framework of the brontosaur. Its estimated length is sixty-two feet. Contrasted with that of Diplodocus, the skeleton of Brontosaurus is characterised by its relatively shorter body and limbs, and its more massive general structure, the arrangements for lightening its weight being more specialised than in any other member of the group. From the rough terminal surfaces of the limb-bones it is inferred that the creature was largely aquatic in its habits; and when sitting down it is supposed that the weight of the body was partly supported by the extremities of the ischia and pubes, which may have been furnished with elastic pads of cartilage or connective tissue.

THE "One and All" Annual, 1905, contains a number of articles connected with gardening, among which are some practical notes on growing mushrooms, celery and herbs.

THE Japanese have a malted preparation, known as ame, which is a kind of candy or barley-sugar, made by the action of barley malt on glutinous rice. Midzu-ame, or liquefied ame, a syrup, forms the subject of an article by Prof. F. H. Storer and Mr. G. W. Rolfe in vol. iii. part iv. of the *Bulletin* of the Bussey Institution, Harvard University. The preparation of ame dates back many centuries, and it is interesting to compare it with *must*, or the more modern wort. Prof. Storey also describes some experiments made with pop-corn which bear out the opinions of previous investigators that popping is caused by bursting of the starch grains.

THE experiments described by Dr. M. Koernicke in the October (1904) number of the monthly journal *Himmel und Erde* prove that both Röntgen and radium rays can produce a very marked action on plants. The general result of exposure of seedlings was to cause retardation and eventually cessation of growth of stem and root; in some cases growth was resumed after an interval, in others the plants never recovered. The first effect of the rays on dry bean and turnip seeds was to accelerate germination, but while the beans ceased to develop after a time, the turnips did not even show signs of retardation; had the exposure been longer, then undoubtedly the turnips would also have reacted.

THE latest number of the *Izvestia* of the Russian Geographical Society (1904, i. and ii.) contains a further report by Colonel Novitsky on his explorations of the range of Peter I., and an interesting and detailed geographical sketch by A. Dunin-Gorkavitch of the northern portions of the government of Tobolsk and its inhabitants. The latter paper is accompanied by a new map of the province, on a scale of 27 miles to the inch, which gives with special detail the inhabitable portions of this immense region. M. Dubyago gives the results of new pendulum observations in the Urals.

A "CONFERENCE NUMBER" of the *West Indian Bulletin* has just been published (46 pp.). It relates to the agricultural conference held at Trinidad on January 4–13, and contains the list of the representatives from the several West Indian colonies who attended; an account of the reception by Sir Henry Jackson, the Governor of Trinidad; a verbatim report of the presidential address by Sir Daniel Morris; and an abstract of the proceedings at the conference and social gatherings. A full account of the papers and discussions will form No. 4 of vol. v. and No. 1 of vol. vi. of the *Bulletin,* and afford valuable information on the great progress made in scientific agriculture in the colonies since the Imperial Department was called into existence by Mr. Chamberlain a few years ago.

WE have received a copy of the meteorological observations made at the Adelaide Observatory and other places in South Australia during the years 1900–1901, under the direction of Sir Charles Todd, Government astronomer. Although the rainfall of some districts is still unrepresented, the monthly and yearly results are published for 463 stations in 1900, and for 474 in 1901, and these are compared with the averages for previous years. This represents a very large amount of valuable work, in addition to that entailed by the usual tables of meteorological results for a large number of stations distributed over the colony. A table is given showing the approximate mean monthly rainfall over the whole of the agricultural districts from the year 1861, and the average yield of wheat per acre. It is pointed out that wheat-growing can only be successfully prosecuted where the percentage of winter rains is largely in excess of that for the summer months, which is only usually the case in the southern districts.

WE are glad to be able to announce the issue of part i. of the new edition of Dr. Hann's excellent "Lehrbuch der Meteorologie." Although so short a period has elapsed since the publication of the first edition, the science has made such important advances, owing to the results obtained from international balloon and kite observations, and from the study of the movements of the upper air by means of cloud observations, that some of the older theories have to be modified, and a new edition has been rendered necessary. We learn from the notice accompanying the part in question that while many details not considered essential to ordinary readers will be omitted, the principles of the theories adopted in recent investigations by men of science, *e.g.* Prof. Bigelow, in the United States, Dr. Shaw, in this country, and Dr. Hildebrandsson, in Sweden, will be included. The work will consist of about six parts; the first deals with air-temperature generally, and with the amount of heat received by and radiated from the solid and fluid surface of the earth. From a communication from Dr. Hann which we lately published we learn that his elaborate meteorological charts will, so far as possible, be extended and include the important additions to our knowledge made by recent expeditions to the Antarctic regions.

FROM Dr. Carmelo Scrivanich we have received a short pamphlet, printed by the Tipographia sociale of Spalato (Italy), dealing with the question of the origin of matter, a subject on which the author invites discussion.

AT the present time investigations of the law of force between two elements carrying currents (Ampère's and allied laws) are commonly regarded as chiefly of academic interest. Several papers on this subject have been written at various times by Dr. Franz Kerntler, of Budapest, and a further paper dealing with the "correct law" as claimed by the same author has just been issued by him. It is published by the Budapester Lloyd Press, and bears the date 1905.

THE internationalisation of scientific literature is well illustrated by the publication in the *Proceedings* of the Academy of Amsterdam of a paper in English by Prof. Sommerfeld, of Aachen, on a simplified deduction of the field and the forces of an electron moving in any given way. The paper is supplementary to one published in the *Göttinger Nachrichten,* and leads to the conclusion that the motion of an electron with velocity exceeding that of light is impossible, as it would require an infinite expenditure of force and energy to maintain it, if the electron be regarded as a sphere with a uniform surface-charge. On the contrary, in the case of a sphere with a bodily-charge the force remains finite. In this problem the electron moves faster than the field of force which it propagates outwards, and a "shadow of motion" is produced. A simple illustration might be afforded by comparison with the effects produced on a sheet of still water by a disturbance moving with a velocity greater than that with which the ripples which it produces radiate outwards.

IN the "Publicationen des astrophysikalischen Observatorium zu Potsdam," No. 41, Dr. Lohse gives the results of a detailed study of the photographic spark spectra of the metals titanium, vanadium, chromium, manganese, iron, nickel, cobalt, molybdenum, palladium, tungsten, iridium, bismuth, lead, uranium, zirconium, lanthanum, cerium, thorium, and didymium. In the majority of cases the region investigated is from λ 340 to λ 400, but for a few metals the record is extended towards the red. Thus, the record for iron goes to λ 446, uranium to λ 431, zirconium to λ 471, lanthanum to λ 567, cerium to λ 467, and didymium to λ 569. The wave-lengths are given to the nearest hundredth of a tenth-metre, and a comparison of these with Rowland's wave-lengths for corresponding solar lines indicates that they are probably correct to within 0·03 tenth-metre in the mean. Lohse has adopted the awkward intensity scale of 0.1 to 10, thus allowing for a hundred gradations. Such a large range is neither necessary nor practicable, and it would have served a better purpose to have kept to the scale 1 to 10 which he used in a previous publication on the same subject. A thorough and detailed knowledge of the spark spectra of the chemical elements is of primary importance in the proper study of celestial spectra, and Dr. Lohse's record will be very useful in that connection. It seems to us, however, that his work would have been greatly enhanced in value if he had confined his attention to the same region of spectrum for each metal, and had included the portion from λ 400 to λ 486 (F), say, especially as that is the region of stellar spectra most ordinarily investigated.

INDEXES to the literature of gallium (1874–1903) and germanium (1886–1903), prepared by Dr. P. E. Browning, have been issued as parts of vol. xlvi. of the Smithsonian *Collections*.

THE general occurrence of radium in association with uranium has formed an important argument in connection with current views relative to the formation of radium. In a recent note M. Danne states that certain plumbiferous earths in the neighbourhood of Issy-l'Évêque contain radium, but are completely free from uranium. Certain facts seem, however, to indicate that the radium has made its appearance in the pyromorphite at a comparatively recent date through the medium of radio-active water from springs in the neighbourhood.

THE International Committee on Atomic Weights has issued its annual report and a table of numbers for use during 1905. On the basis of new determinations, changes are recommended in the atomic weights of indium, iodine, rubidium, and samarium. As the result of several independent investigations on the atomic weight of iodine, there can now be no reasonable doubt that the value 126·85 given by Stas is too low, and 126·97 is adopted in the new table. The atomic weight of nitrogen would also appear to be much closer to the round number than is represented by the value 14·04 at present in use, and further investigations of this element are needed.

AN interesting paper on the production of calcium cyanamide and its employment in agriculture as fertiliser was recently read by Prof. Frank before the "Klub der Landwirte" in Berlin. As manufactured at present, 250 kilograms of atmospheric nitrogen can be obtained per year in the form of calcium cyanamide for each electric horse-power. The efficiency of the substance as fertiliser has been established by experiments at a large number of agricultural stations, and the combined nitrogen is stated to be as effective as an equal quantity in the form of ammonium sulphate or Chili saltpetre.

THE much discussed question as to the nature of the hydrosulphites has been subjected to further experimental investigation by Messrs. Baumann, Thesmar, and Frossard, and an account of these experiments is given in the *Revue générale des Matières colorantes,* vol. viii., p. 353. The view of Schützenberger that hydrosulphurous acid is to be represented by the formula H_2SO_2 receives strong confirmation. As is pointed out, the crystalline sodium salt $Na_2S_2O_4.2H_2O$ obtained by Bernthsen may be written $NaHSO_2{\cdot}NaHSO_3{\cdot}H_2O$, and the behaviour of the mother liquors, from which this salt separates, corresponds with this view. In fact, two formaldehyde compounds corresponding to $NaHSO_2.CH_2O.2H_2O$ and $NaHSO_3.CH_2O.H_2O$ have been separated and analysed.

A NEW booklet has been added by Messrs. Dawbarn and Ward, Ltd., to their "Country House" series of practical handbooks. It is by Mr. D. Grant McIver, and is entitled "Pruning, Training, and Trimming Trees and Shrubs."

MR. JOHN MURRAY has published an attractive English edition of Prof. W. H. Pickering's work on "The Moon," the American edition of which was reviewed in NATURE of May 5, 1904. The work contains a summary of the existing knowledge of our satellite, and the statement of Prof. Pickering's observations and arguments in favour of lunar activities, illustrated with a complete photographic atlas of the moon. The price is two guineas net.

THE second volume of "Papers of the British School at Rome" has been published by Messrs. Macmillan and Co., Ltd. The volume is by Mr. T. Ashby, jun., and is concerned with sixteenth-century drawings of Roman buildings attributed to Andreas Coner. The drawings are preserved in Sir John Soane's Museum at Lincoln's Inn Fields, London. The contents of the sketch-book in which the original drawings are preserved include ground plans, plans and elevations of tombs, elevations, architectural details, Doric entablatures, Ionic and Corinthian entablatures, plain mouldings (cornices and plinths), Doric capitals, and plain and ornate bases. The reproductions of these sixteenth-century drawings which are now available will be of great service for the purposes of study and criticism.

OUR ASTRONOMICAL COLUMN.

EPHEMERIS FOR BROOKS'S COMET, 1904 I.—On a photograph obtained at Greenwich in January the image of Brooks's comet (1904 I.) was quite strong, and indicated that the object was, probably, not fainter than the eleventh magnitude. The following is an ephemeris for this object as given in No. 354 of the *Observatory*.

Ephemeris 12h. M.T. Greenwich.

1905	R.A. h. m. s.	Dec. ° ′
Feb. 17	9 55 56	+64 37
,, 23	9 34 55	+64 25
Mar. 1	9 15 34	+63 55
,, 7	8 58 27	+63 11

This ephemeris required corrections of −5s. and −0′.8 on December 7, and shows that the comet is travelling in a westerly direction through the constellation Ursa Major. On March 7 it will be very near to, but S.W. of, τ Ursæ Majoris.

OBSERVATIONS OF COMETS.—A number of photographic and visual observations of Encke's comet were made by M. Quenisset at Nanterre during December. The photographs obtained show that the comet gradually became brighter during the period covered by the observations, and that the coma was extensive and fan-shaped, its extension being in a W.S.W. direction, *i.e.* turned away from the sun. On the photographs this coma was about 4′ in diameter and contained a nucleus which was not at the centre. Visual observations made on December 7 showed the fan-shaped coma to be 5′ or 6′ in diameter with the nucleus situated near to its E.N.E. edge and having a position angle of about 70°, reckoned from the centre of the coma. On this date the comet was at the limit of naked-eye visibility, its estimated stellar magnitude being about 6.5.

Borrelly's comet (1904 *e*) was also observed, photographically and visually, on January 1 and 2 by M. Quenisset, and was seen as a faint nebulosity of 1′.5 to 2′ diameter with ill-defined boundaries. A very faint nucleus of magnitude 11.5 occupied the centre of the coma, and the photograph obtained on January 2 showed a faint tail extending in an E.S.E. direction (*Bulletin de la Société astronomique de France,* February).

ADDITIONAL PERIODICAL COMETS DUE THIS YEAR.—In addition to those periodical comets previously mentioned by Mr. W. T. Lynn as being due at perihelion this year, Mr. Denning, writing to the *Observatory,* mentions Tempel's 1867 comet, which should pass through its perihelion point in April. This object has suffered considerable perturbations from Jupiter, which have lengthened its period from 5.982 to 6.539 years, and have changed its perihelion distance from